

App. No. 10/750,520

Response to Office Action dated May 19, 2006

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REMARKS

This is a full and timely response to the non-final Office Action of November 1, 2005. Reexamination and reconsideration are courteously requested. By way of the present amendment, claim 13 is amended. Further, claims 23 to 24 are canceled, and claims 26 to 29 are newly added. Thus, claims 13, 15 to 22, and 25 to 29 are pending upon entry of the present amendment, with claims 13 and 26 being independent claims.

A. Rejections Under 35 U.S.C. § 103(a)

Claims 13, 15 to 21, and 25 are rejected as being unpatentable over U.S. Patent No. 6,312,643 (Upadhyaya) in view of U.S. Patent No. 4,041,123 (Lange). Further, claims 22 to 23 are rejected as being unpatentable over Upadhyaya in view of Lange and U.S. Patent No. 9,602,699 (Fritzscheier). These rejections are respectfully traversed.

Claim 13 as amended recites a method for consolidating a shaped nanophase aluminum powder, including the step of encompassing the powder with a flowable pressure transmitting medium, and compressing the heated medium at a first temperature to at least about 100,000 psi to thereby consolidate the powder. Thereafter, the medium is further heated to between about 700 °F and about 1000 °F, and the medium is compressed at the increased temperature to at least about 100,000 psi to thereby further consolidate the powder.

In contrast, Upadhyaya discloses a method in which a powder is consolidated by compressing a pressure transmitting medium using either a single compressing step during which the medium is heated, or using two compressing steps wherein the medium is only heated during the second step. The Examiner relies upon Lange for disclosing a compressing method during which heat is applied in numerous steps, and this point will be discussed hereafter. In any case, Upadhyaya fails to teach or suggest that the pressure transmitting medium is compressed for both steps at a pressure of at least about 100,000 psi as presently recited in claim 13. In fact, Upadhyaya clearly teaches that compression is performed at no greater than 50,000 ksi (col. 7,

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lines 1 to 15). Since Upadhyaya is directed to consolidating nanoscale aluminum powders, a person of ordinary skill in the art would not find a suggestion in Upadhyaya of a process in which such nanoscale aluminum powders are consolidated by compressing a transmitting medium to at least 100,000 psi. Further, Lange fails to teach or suggest compressing at such high pressures, despite the fact that Lange is directed to compressing many compositions that are much harder than nanoscale aluminum powders. For at least this reason, the combination of Upadhyaya and Lange fails to teach or suggest the presently claimed invention, and the rejection of claims 13, 15 to 21, and 25 should be withdrawn.

Further, even though both Upadhyaya and Lange are directed to methods of consolidating various metal powders, a person of ordinary skill in the pertinent art would not be motivated to combine the teachings of these two references and thereby arrive at the claimed invention. Upadhyaya is directed to compression of nanoscale aluminum alloys, while Lange is directed to compression of much larger ceramic materials such as silicon nitride, which has a Mohs hardness of >9. Meanwhile, the present invention is directed to compression of nanophase aluminum powder, which has a hardness of <3.

Since aluminum is such a soft metal, a person of ordinary skill in the art would not recognize the incremental heat and pressure steps to consolidate hard ceramic materials described by Lange as necessary or pertinent to the task of consolidating nanophase aluminum powders. "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." M.P.E.P. § 2143.01.

Finally, Fritzemeier is cited by the Examiner for allegedly disclosing the features recited in pending claims 22 and 23. However, Fritzemeier fails to teach or suggest the above-discussed features recited in claim 13. Claims 22 to 23 are therefore patentable at least due to their dependency from claim 13.

Newly added claim 26 recites that the first compression step is performed with the pressure transmitting medium heated to a temperature of about 700 °F, and that the second compression step is performed at a higher temperature, but not greater than about 1000 °F.

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Claim 17, which depends from claim 13, also recites the feature of the first compression step being performed with the pressure transmitting medium heated to a temperature of about 700 °F. As previously discussed, Upadhyia discloses a method in which a powder is consolidated by compressing a pressure transmitting medium using either a single compressing step during which the medium is heated below 700 °F (col. 5, lines 24 to 25, heating to between 482 and 662 °F), or using two compressing steps wherein the medium is only heated during the second step. Thus, Upadhyia fails to teach or suggest a plurality of compressing steps in which the first step is performed at about 700 °F. None of the other cited references teaches or suggests this feature either. For at least this reason, claims 17, and 26 to 29 are believed to be patentable in their own right.


In view of Applicant's amendments and remarks, it is respectfully submitted that Examiner's objections and rejections have been overcome. Accordingly, Applicants respectfully submit that the application is now in condition for allowance, and such allowance is therefore earnestly requested. Should the Examiner have any questions or wish to further discuss this application, Applicants request that the Examiner contact the Applicants attorneys at the below-listed telephone number.

If for some reason Applicants have not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to prevent abandonment on this application, please consider this as a request for an extension for the required time period and/or authorization to charge Deposit Account No. 50-2091 for any fee which may be due.

Respectfully submitted,

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